

Inorganic and Organic Chemistry

CAPILLARY GAS CHROMATOGRAPHIC DETERMINATION OF FATTY ACID COMPOSITION OF A SERIES OF OILS BEFORE AND AFTER HYDROGENATION

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An instructional laboratory using gas chromatography was developed for a topical module on fats and nutrition as part of the introductory chemistry curriculum at Beloit College. Samples of canola, soybean, peanut, vegetable, and olive oil were hydrogenated at low pressure using H_2 over a palladium on charcoal catalyst. The hydrogenated oils and the original oil samples were trans-esterified with anhydrous sodium methoxide ($NaOCH_3$) to produce the methyl esters of the fatty acids. The resulting fatty acid methyl esters were then analyzed via temperature-ramped gas chromatography. For each hydrogenated sample, a notable decrease in the amount of polyunsaturated C18 fatty acids was found, as was a corresponding increase in the amount of C18 saturated fatty acids. By using a slower temperature-ramped method, positional isomers produced by the hydrogenation reaction were discernible.